

INTRODUCTION

Chief's Island is located wholly within the Okavango Delta of Ngamiland, the baTswana tribal area in northwestern Botswana (Fig. 1).

The Okavango Delta is the world's largest inland delta (Standish-White, 1972) and is fed by southern Africa's second largest river system, but one whose discharge never reaches the ocean (Brind 1954). However, this water serves to maintain a swamp system in an otherwise semi-arid environment with large quantities of water lost via transpiration and evaporation. Most other endorheic drainage systems spill into shallow lakes or inland seas, viz. Lake Chad, the Dead Sea and the Caspian Sea (Standish-White, *op. cit.*).

The vast inland Okavango Delta covers a surface area of about 16 200 km²; and lies on Kalahari sands and alluvial soils of varying texture, with which calcrete and silcrete are associated (Wellington 1955 a). The Delta supports a high wildlife biomass, at present utilised for tourism, trophy hunting and tribal hunting; whilst stock and crop farming are encroaching from all sides into the Delta.

Various estimates of perennial versus seasonal areas of inundation exist. My own estimates are: about 3 000 km² comprises permanent swamp, about 5 000 km² seasonal swamp and the remainder dryland masses or islands. The degree of flooding at any particular time is dependent on local summer rainfall and floodwaters from southern Angola's Cuito and Cubango catchment areas.

The presence of tsetse-fly, *Glossina morsitans* excludes domestic stock from large areas of the Delta, but efforts are and will continue to be made to control and possibly eradicate this fly.

As semi-arid Botswana develops so the demand for water increases, and the Okavango River/Delta system is the only permanent inland surface source (Morse, Hadow, Hawes, Jenkins and Phillips, 1960).

The Okavango Delta drainage is very unstable due to its topographical low gradient (1 : 5 000); prevalence of seismic activity and susceptibility to channel blockage, altering water flow.

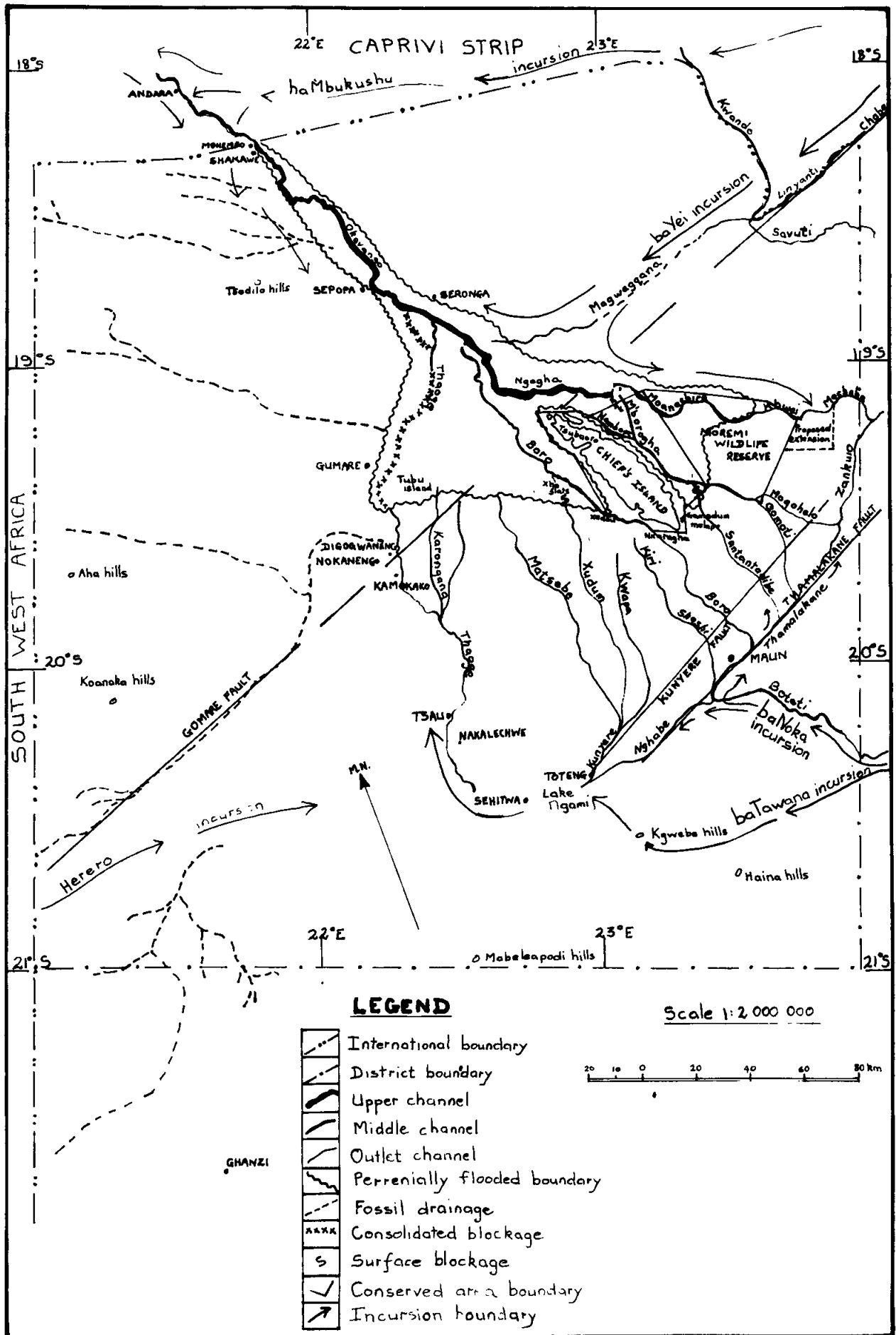


FIGURE 1 – Map of Ngamiland and Okavango Delta, Botswana, also depicting African incursion routes.

Some water manipulations to increase outflow are bound to take place. Such can be achieved with minimal alteration to the conserved areas, and hopefully, with minimal damage to this unique ecological entity.

Proposals by the authorities concerned to extend the size of the present Moremi Wildlife Reserve by including Chief's Island and parts of its adjacent floodplain systems (now a gazetted reality), plus the envisaged probable water manipulations initiated this study, which aims to document all existing ecological conditions and provide for some added water take-off and a management proposal for the Delta with minimal disturbance to the prevailing conditions.

The study area chosen was Chief's Island and its associated vegetation types, the latter being where such water manipulations will most likely take place and/or have its effect.

THE STUDY AREA

LOCALITY AND DESCRIPTION

Chief's Island and the adjacent floodplain systems now included under Tribal Game Reserve extension (Fig. 1), lies within the central Okavango Delta, Ngamiland, northwestern Botswana. The study area covers the major part of the grid formed by latitudes 19°06' and 19°36'S, and longitudes 22°45' and 23°30' E.

Chief's Island is the largest island in the Delta being approximately 850 km². The surrounding study area comprises islands of much smaller size varying down to termitaria. Inbetween and surrounding all these islands are the various aquatic and floodplain vegetation types forming a mosaic of plant communities, each community's existence being largely dependent on elevation or geomorphology, soil type and annual flooding pattern.

The Tribal Game Reserve extension area comprises approximately 1 812 km² and extends westwards from the existing Moremi Wildlife Reserve of 1 560 km², providing for a 116 per cent size increase of conserved Delta area. Tribal authorities may add another 358 km²

on to the east of the existing Moremi boundary. This is mainly woodland with some Khwai and Mochaba River drainage along its northern boundary. This will provide for 21 per cent and 23 per cent of conserved Delta area respectively.

For the greater part the reserve boundaries of the study area are arbitrary and imaginary lines. Exceptions are along the Boro River in the west from Nxaragha to Xedau in the Xho flats area, and the Gamadum Melapo to the south of Chief's Island (Fig. 1). The total conserved unit is surrounded by hunting areas. This renders arbitrary imaginary boundaries difficult to define and problematic to control.

The nearest town is Maun, administrative capital of the baTswana tribe. Maun lies on the Thamalakane River draining the major Delta distributaries; and is about 75 km SE of the southern tip of Chief's Island by track. Chief's Island is only accessible by track in low flood years and possibly for a few months in medium to high flood years. Invariably some inundated areas have to be crossed dependent on the present flood regime. During high water conditions access to near Chief's Island is by water navigation up the Boro River from Maun, or from Moremi via the Moanashira and M'borogha Rivers. Light aircraft access is similarly available from Maun at present.

The name Okavango was not derived in Ngamiland. Stigand (1923) after collaboration with the German Missionary Oblate Fathers at Andara proposed the name Okavango to be derived from a corruption of the Portuguese Cubango. This is the name of the major tributary above its confluence with the Cuito. Initially, the name was probably obtained from some tribe living in that area. As Stigand (*op. cit.*) further points out, the Delta's rivers have various names along their course. These are named by the local inhabitants and it is often still difficult to define where one starts and the other stops. The whole Delta is divided into areas, islands or tracts varying in size but all named. However, very few guides still exist who are fully conversant with these over any large area.

Chief's Island itself is a European-derived name designated about the 1930's to the largest island in the Delta. Theoretically, it was always for the sole hunting rights of the chief or his nominees. *Campbell (*pers. comm.*) states that the area actually only included Tshubaoro. This comprises a group of small to medium sized islands and an extensive surrounding floodplain at the northern tip of the current Chief's Island.

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Chief's Island is at present classified as non-hunting area. Locally it is still subdivided into at least eight tracts or areas. As with Tshubaoro there is some evidence that these may have been separate islands or island complexes in the past. With increased dessication and altered flow in this area all are virtually now united as a single island.

The Okavango Delta, roughly shaped as an equilateral triangle with 180 km sides, covers approximately 16 200 km². Of this about 50 per cent is dryland masses and islands, only partially flooded under extreme circumstances; 31 per cent are subject to seasonal flooding and 19 per cent more or less permanently flooded.

HISTORY

This section involves the historical background of the Okavango Delta and Ngamiland.

The indigenous human population of the Delta would appear to be the baNoka (people of the river, so-called river bushmen or maSarwa) (Tlou, 1972). This is the collective name for several discrete swamp groups of Khoisanoid origin (Van Hoogstraten, In Cowley, 1969). The homogeneous parent stock were the baTeti, living along the Boteti River from Lake Xau in the east to the Delta's base, and named after that river.

Migration then took place up the various distributaries – probably not far, and establishment of several discrete groups occurred. Further migration upstream probably occurred as a result of new mobility in the form of megoro, (dugout canoes), introduced in c. 1800 by baYei and haMbukushu, and from the baTawana and maKololo incursions (Tlou *op. cit.*).

Small remnants of these groups remain today but largely intermarried with baYei and will probably soon become extinct as distinct ethnic groups. Such groups did exist and their remnants formed the basis for study expeditions viz Van Hoogstraten (1966), Heinz (1969), for baQanikhwe (northern delta), baKakhwe (southern and middle delta) and baGumahii (scattered). The large number of areas still carrying names of Khoisanoid origin in the Delta attest to their early colonization.

The baYei (derrogatory maKuba) were the first bantu speaking group to enter Ngamiland. They migrated from Diyei, just off the confluence of the Chobe and Zambesi Rivers in about 1750 (Stigand, 1923; Tlou, 1972). Today they are numerically the strongest group but are subservient to some of the other groups (Pole Evans, 1948). Initially they settled in localised spots but are now widespread.

Initially the baYei had no knowledge of Lake Ngami but stumbled on it during hunting expeditions. They named it Ncama, later corrupted to Nghabe and eventually Ngami by baTawana and Europeans respectively. At Lake Ngami they encountered hippopotamus (*Hippopotamus amphibius*) in abundance (Tlou, *op. cit.*) These were occasionally thrown ashore by wave action, attesting to the size of the Lake in those days (eighteenth century).

The baYei migrations resulted from northern incursion and local overpopulation (Fig. 1). Tlou (*op. cit.*) accentuates the latter cause but all took place gradually between approximately 1750 and 1800.

About 1795 a quarrel took place between the two sons of the baNgwato chief Mathiba. Tawana, the younger son, fled with a section of his tribal followers. They followed the Boteti River upstream and branched off at the Kgwebe Hills. The baKgalagari resident at Kgwebe Hills were driven off and Tawana established himself there (Nettleton, 1934; Sillery, 1952). They were aware of Lake Ngami and the baYei under Hankuzi (Sankose of earlier literature) with their mekoro. Possibly fear of the water mass and malaria curbed the baTawana from moving there. The Khoisanoid groups were brought into subjection by the baTawana, but not the baYei.

Tawana was killed by his son Moremi I in about 1820. During Moremi I's reign, Sebetwane and his maKololo successfully attacked the baTawana in 1825 (Nettleton, *op. cit.*) or 1828 (Sillery, *op. cit.*) and took most of their stock. The baYei escaped into the swamps, whilst the baTawana fled and settled in the Caprivi Strip near the Chobe River. The baTawana were later followed north by Sebetwane, (after he was repulsed in Damaraland) who brought them into subjection. The young heir apparent Letsholathebe and his mother disappeared during this attack. Later, during a plan of violence by Sebetwane, some baTawana fled whilst others remained. Of the latter some notables were murdered, whilst others were left untouched (Kgabo and Meno, sons of Moremi I) and continued to live with the maKololo (Sillery, *op. cit.*). Mogalakwe and his followers who fled this violence towards Lake Ngami,

met up with a man of the baSubia tribe whom they wished to kill. They spared his life when he promised he would lead them to a boy who appeared to him to be one of their kinsmen. This boy turned out to be the lost Letsholathebe whom this party took to the present day Toteng and installed as Chief in about 1840 (Sillery, 1952). These remnant baTawana had no possessions and took over the cattle of the baYei and baKgalagari living at the Lake. This occurred under threats of duress without actual warfare, and the subjection of the baYei who had hitherto been treated as equals stems from this date.

The haMbukushu originally resident at Katima Mulilo first emigrated to the Kwando valley. They later moved to Andara where they established themselves, only trickling down into northwest Ngamiland in the nineteenth century (Tlou, 1972).

The haMbukushu migrations from Andara into Ngamiland resulted from dissatisfaction to their king's attitude. Subjects of his were being sold to the mambari slave traders from Angola. The major migrations took place after the baTawana established their state. These began during the reign of Letsholathebe I (approximately 1847-74), and increased during the reign of Moremi II (1876-90) (Tlou, *op. cit.*).

During 1970, a further haMbukushu migration took place. Fleeing refugees from southern Angola and part of the Caprivi Strip moved into Etsha (near Gomare) in the wake of colonial warfare. These peoples have settled permanently in Ngamiland, having taken out citizenship in preference to returning to a decolonised Angola.

The first Europeans to reach Lake Ngami were Wilson, Oswell, Murray and Livingstone on August 1st, 1849 (Le Roux, 1939). The next decade followed with many notable naturalist, hunter, trader and missionary visits to Lake Ngami, viz Edwards: 1850, Viljoen: 1851, Petrus Jacobs: 1851, Green brothers: 1851, Swartz: 1851, Leyland: 1851, Anderson: 1853, Chapman: 1853, Wahlberg: 1855, Baldwin: 1858, Mackenzie: 1861, and Baines: 1861 (Tabler, 1973).

Very limited penetration of the Delta took place initially. Probably all the requirements in hunting and trading could be obtained near Lake Ngami. They also mention fear of subjecting themselves to "noxious effluvia" caused by stagnant waters and responsible for various dreaded diseases. Andersson (1856) and Green (1857) published accounts of upstream navigation of the Thaoge River from Lake Ngami. Andersson reached the vicinity of Tubu Island for trading purposes with the baYei. Green, in 1855, equipped with a

custom-built boat, transported up from Cape Town, apparently navigated further upstream. Green was accompanied by Wilson and the trip's objective was an attempt to find navigable channels to the west coast, and to visit Andara. The river trip was abandoned due to lack of progress.

During this decade, Kgabo and Meno rejoined the baTawana from the Chobe maKololo. About 1860, Sekeletu, son of Sebetwane raided the baTawana, who fled to the Kgwebe Hills. Here, they repulsed Sekeletu's attack, but lost some of their stock to him. The loot consisted mainly of small stock which necessitated the building of a crude raft to get them across the Thamalakane River. The site chosen was above Matlapaneng at a drift still known as Lekawen or Sebetwane's drift.

In 1875 and 1877, two parties of Dorsland trekkers passed Lake Ngami on their way to Angola. They consisted mainly of Transvaal farmers and Doppers, (Reformed Church) dissatisfied with President Kruger's religious leanings and the doings of his government; and were so-called due to the waterless tracts they had to cross. H.M. van Zyl, an early and the first white Ghanzi resident, probably influenced the Dorsland trekkers to migrate in the direction they did (Tabler, 1973).

In 1882, the Matebele from Rhodesia attacked the baTawana, who suffered large stock losses and had to take refuge in the Delta. This was followed up by a second Matabele attack in 1884 or 1885. This time, the baTawana herded all their cattle onto a large island in the Delta, entering through Tsau and losing none (Sillery, 1952). The Matebele sustained heavy losses, supposedly 2 500 out of a raiding party of 4 000 when ambushed at a river crossing.

The baTawana cautiously kept their capital well up river after this; firstly at Digogwaneng till 1888, then at Kamokako until 1891. On both occasions floodwaters pushed them southwards. In 1891, they moved to Nakalechwe, but later, due to drying-up back to Tsau (Sillery, *op. cit.*).

Moremi II died in 1891 and chieftainship was taken over by Sekgoma. During 1894 or 1895 Sekgoma led a very successful foray into southern Angola, returning with many cattle and captives.

In 1896, rinderpest broke out causing heavy mortalities to domestic stock and wildlife. The reduction and absence of blood meal reduced the tsetse fly distribution to limited “pockets”, probably all within the Delta.

The present-day Ghanzi farms were created in 1897 (Chirenje, 1971) as a result of C.J. Rhodes’ effort to prevent German expansion eastwards from German South West Africa. The baTawana chief Sekgoma agreed to this provided that a tribal reserve was demarked for his people. This was declared in the High Commission Proclamation No. 9 of 1889 (Stigand, 1913).

During 1902, the Mababe Marsh dried up resulting in the baSubia moving up to the Chobe system.

The German/Herero war of 1904/5 resulted in the arrival of Herero refugees from German South West Africa.

During 1906, Chief Sekgoma was removed by the then Protectorate Government due to possible tribal bloodshed and replaced by the more favoured Mathiba (Sillery, 1952).

From 1910 to 1923, Captain A.G. Stigand surveyed and produced a map of Ngamiland and the Delta. This well-annotated map, together with his published notes, is a valuable contribution to early knowledge of this area.

The baTawana tribe moved their capital from Tsau to Maun in 1915.

During 1918, Professor E.H.L. Schwarz (1920) put forward his ideas on thirstland redemption by recreating massive open water bodies viz Makgadikgadi Pan, Lake Ngami, Etosha Pan and Mababe Marsh. This focused southern Africa’s attention on the Okavango and Chobe systems and other fossil drainage nearby.

Schwarz’s theories resulted in such public acceptance of increased precipitation over southern Africa, that the then Union Government sent out an investigation team. This gave rise to the Department of Irrigation’s report of the Kalahari Reconnaissance led by A.L. du Toit in 1925, (Du Toit, Shalto Douglas, Noaks, Buckland & Stegmann, 1926). The report discounted most of Schwarz’s proposals. The year 1925, itself, was a year of great floods in Ngamiland.

From August to October 1931, the acting resident magistrate of Ngamiland, Ellenberger, made a boat trip from Maun to Mohembo and back to Maun. This trip was made to inspect river channels and blockages.

Ellenberger (1931) left important and detailed notes of this trip. Partially as a result of this trip, Drotsky and Naus were independently involved in blockage clearance and channel improvement. Drotsky worked mainly on the Thaoge and Ngokha Rivers, whilst Colonel Naus worked on the M'borogha, Gomoti, Santantadibe and Thamalakane River systems.

During 1933, Chief Mathiba died. In 1934, the first recorded outbreak of foot and mouth disease occurred in Ngamiland, (Falconer, 1971).

During 1937, J.L.S. Jeffares was engaged by the then Bechuanaland Government to carry out a survey of the Okavango Delta. This involved suitable gauging, levelling and blockage removal and provides good hydrographic data existing then (Jeffares, 1938). Moremi III was installed as chief during this year.

In 1944, another foot and mouth outbreak occurred as well as plague (Falconer, *op. cit.*).

In 1945, a further expedition resulting from Schwarz's theories visited the Delta. The so-called Conroy expedition then published their findings (Mackenzie, Amer, Kokot, Oldfield, Mech and Midgley, 1946); these confirming with the findings of the 1925 expedition. However, local improvement of irrigation and development of navigable waterways were possible but of no value to South Africa.

Chief Moremi died in 1946 and the tribe installed Mrs Moremi as regent during her son's minority.

In 1949, Wellington proposed a new irrigation development scheme for the Okavango.

A three-year survey was conducted by Brind (1954) from 1951 to 1953, carrying out leveling traverses to establish land and water gradients, beacons and bench marks. He also developed a papyrus cutting machine, studied water movement through various channels and took some soil samples. No action was taken on his recommendations for water development at the base of the Delta.

During the late fifties, crocodile-hunting commenced on a commercial basis. Lurie and Wilmot operating from Shakawe and Matlapaneng respectively, cropped large numbers of crocodile (*Crododylus niloticus*). Commercial crocodile-hunting ceased during the late sixties.

In 1959, an economic survey mission led by Morse, examined the country's water resources, and concluded that long-term water development would have to rely on the Okavango system.

Game hunting has always played a role and took place virtually anywhere prior to 1962. In 1963, safari companies were leased hunting blocks. Jao, Santantadibe and Khurunxaragha areas, nos. 17, 18 and 21 respectively, all embraced part of the study area. At the end of 1973, these blocks' boundaries were altered to prevent hunting in the study area, but this was not gazetted until 1976. In 1965, Letsholathebe II became chief of the baTawana.

On the 30th September, 1966, Bechuanaland became the independent Republic of Botswana.

In 1967, the Republic of Botswana Government requested United Nations assistance for power, water and transportations economic provision to enable development of ore deposits in eastern Botswana. Sir Alexander Gibb and Partners (1969) were engaged as consultants, and a UNDP team carried out various disciplines of research in the Delta.

B G A Lund and Partner (1969) proposed improvements to some of the Delta channels to assure sustained water supply to Orapa Diamond mine.

In March, 1971, Anglo-American Corporation introduced a dredger and dredged a small section of the Thamalakane River as commenced activities to improve water flow. During late 1971, and 1972, this work continued about 7 km up the Boro River from its junction with the Thamalakane River. The Boro River dried up in early 1973, and improvement work to this channel continued with front end loaders. In total, about 15 km of channel was improved and sideways (off-stream) drainage to surrounding floodplains was blocked by means of bunds. All this work was terminated by the Botswana Government at the end of 1973.

During late 1973, a follow-up UNDP team recommenced research in the Delta.

HUMAN UTILISATION

Historical

In this section, the emphasis is on the study area where the baNoka groups lived mainly as hunter/gatherers since their movement was dictated by their search for game and edible plants. The baNoka had certainly been resident in the study area, albeit sometimes only seasonally. Game was obtained mainly via game pits and traps. Plants utilised included waterlily (*Nymphaea* spp.), bullrush (*Typha latifolia*), papyrus (*Cyperus papyrus*), palms (*Phoenix reclinata*, *Hyphaene ventricosa*), African mangosteen (*Garcinia livingstonei*), sourplum (*Ximenia* sp.) and donkeyberry (*Grewia* spp.).

Initially, no crop cultivation was practised by the baNoka. A crude form of papyrus raft (huzenje or lekawa) was used for downstream transportation only by the baNoka. These rafts are made of chunks or blocks of living papyrus with additional papyrus stacked above this and were one of the greatest initial factors leading to channel blockages (Naus, 1936 b). Fishing methods and cultivation techniques were introduced to the baNoka by the baYei and the haMbukushu (Tlou, 1972).

The baYei cultivated and stock farmed where they could in tsetse fly free areas. The baYei were good fishermen, producing their own nets from mokgotse (*Sansevieria* spp.). Fish traps including baskets, weirs and fences with baskets were all utilised. The baYei excelled at hippopotamus hunting, either by setting weighted harpoon traps across hippopotamus paths (Anderson, 1856); or by hunting hippopotamus from papyrus rafts which they could not capsize (Tlou, *op. cit.*).

The baYei and the haMbukushu differentiate agriculture on the basis of floodwaters and rain; the former is referred to as tshimo ya bokgola (moisture fields) and the latter as tshimo ya pula (rainfields).

Crops such as sorghum, millet and maize were introduced by the baYei, who also introduced sheep, goats, fowls and dogs. The baYei learned their hunting techniques from the baNoka. All these residents consumed wild honey and their belief until recent times, was that a certain type of honey produced sleeping sickness (Naus, 1935).

From verbal evidence, the majority of past residents in the study area were probably baNoka and baYei. Stock and crop farming were most definitely practised on a small scale.

The baTawana established cattle posts at Tshubaoro between 1904 and 1912. Both Chief Sekgoma and Chief Mathiba hunted this top end of Chief's Island extensively in the early 1900's, (*Smith, pers. comm.). The baTawana informants agree that there were many maSarwa and maKuba (baNoka and baYei) living near these areas. Most informants' agree that the northern and southern ends of Chief's island were tsetse fly free in the early 1900's but that tsetse flies were present in the middle sector.

The baTawana chiefs left representatives in the Tshubaoro area to look after their cattle and game. Apparently, even after all the cattle had died of ngana or were removed, some sort of game custodian was left there for some period (Smith, *op. cit.*). The baTawana informers claim that in about 1917, cattle in the Tshubaoro area started dying. After fairly heavy losses, the baTawana withdrew and sold what cattle remained.

From baYei living near Tshubaoro about that time, a similar sequence of events occurred. These informers could however, give no dates but after losing all their cattle, remained living in the area, hunting and cultivating crops. In the 1940's several human deaths occurred, whereupon the remaining baYei moved further west and north of Chief's Island to tsetse fly free areas.

Several baYei/baNoka groups had villages on islands in the M'borogha floodplains. These groups re-established themselves in three villages on islands just off the north-eastern tip of Chief's Island. Two villages were on Sezita Island and one village on a small island known as Moretu. No domestic stock was kept, but cultivation of maize, millet, pumpkin and watermelon was practised on a small scale.

Calculating from my informant's estimated age, it would seem that the above villages were only established there after the villages on the western side had been abandoned. All three villages were abandoned in about 1958, when three villagers (from separate villages) were killed by 'man-eating' lions (*Panthera leo*). As a result of the above incidents, these villagers moved to Jao and Morije outside the study area, and established new villages. Morije is where Magau, a local headman, still has his village today.

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These most recent sites of cultivation revealed no signs of agricultural scarring; nor could visual vegetation composition changes be detected against similar non-cultivated areas.

The crocodile hunting operations from 1957 – 1969 covered all navigable channels within the study area. Estimated take-off for the Delta varies from about 500 to 2 000 crocodile per annum; the lower figure probably being more acceptable as an annual average for the period. It was fairly common practice to use hippopotamus as bait and to collect crocodiles feeding off the carcass. Local tribesmen also destroyed hippopotami when these were deemed a hazard to mekoro navigation or for meat. It is impossible to gauge how many hippopotamus were destroyed in these ways, or what the effect of these actions was on the flow of some of the more critical channels. Since by physical movement, both adult crocodile and hippopotamus tend to prevent establishment of rooted aquatic vegetation where physical conditions would otherwise be suitable for such establishment, their role in maintaining open channels must not be underestimated. Likewise, hippopotamus are capable of creating and opening up new channels in poorly-drained swamp conditions.

Since many local swamp dwellers were involved in crocodile hunting operations, the hippopotamus probably suffered additional persecution. The hazard of mekoro or boat navigation due to hippopotamus are well documented by several early European travellers in the Delta (Stigand, 1923; Ellenberger, 1931). Chances do exist that many of these aggressive hippopotamus were previously wounded due to the antiquated firearms and ammunition in use by most tribesmen.

The result of this history of crocodile use was that today small crocodile are fairly numerous but that large specimens are rare, and that hippopotamus in most non-conserved areas are only present in low numbers.

Although Chief's Island was for the sole use of the baTawana chief or his nominees during the latter 1800's and up until the 1960's, after which time it was declared a non-hunting area, lack of control could not enforce this. However, most wildlife populations have by no means been severely decimated in the study area.